

and has a most wonderful provision for preventing the erosion of the banks and for adding to the dry land. It is a squat bushy tree, and round the stem, to an extent equal to the spread of its branches, it sends up thickets of straight shoots a foot or two high. These, when the tide is up or the water in flood, catch all the stray branches, leaves, grass, &c., that may be floating about, and also promote silt. By this contrivance, therefore, not only are the banks protected from the distinctive action of water, but also raised and consolidated. Again, as regards Mr. Stoney's observation of calcareous masses in timber, which was brought to the notice of the Asiatic Society of Bengal in 1870 as a fresh discovery, it seems strange that the learned body in question did not know that the existence of such concretions, so far from being very rare, is an occasional and well-known phenomenon. Thus, in the *Madras Journal of Literature and Science* for April-September, 1858, page 142, Prof. Mayer gives a qualitative analysis of a concretion of the kind found in a teak log. It consisted chiefly of magnesia, with potash, lime, silica, and a trace of iron. The substance, he says, "Must be looked on as a mixture, and not a true chemical compound." Again, he observes, "as a whole the substance thus hardened is insoluble in cold, and but slightly so in water of higher temperature. At 212°, however, there is sensible action after a time. In diluted hydrochloric acid solubility ensues, hastened by increased temperature. Solution is attended by slight effervescence, some carbonic acid being liberated." He then proceeds to give an explanation of the process by which such mineral matters may be taken up from the soil and deposited in the tree. So far as I know the occurrence of such concretions in India was first brought to notice by Lieut., now Col. Hawkes, of the Madras Army, in 1858. He had seen them only in teak logs, and remarked that they generally occur "in what carpenters call a shake in the wood, but with this exception the logs are perfectly sound, and no communication whatever with the external air has been observed."

G. BIDIE

Government Central Museum, Madras, May 13

Remarkable Discovery of a Murder in Bermuda

THE following account of a murder which was committed in Bermuda in the autumn of 1878 is taken from a letter written to Gen. Sir J. H. Lefroy, C.B., F.R.S., lately Governor of these islands, and author of the "Annals of Bermuda," by the Attorney-General of the islands, Mr. S. Brownlow Gray. The mode of discovery of the crime is so remarkable that I think it ought to be put on record, and Sir J. H. Lefroy has kindly permitted me to make extracts from the letter for that purpose. I believe no account of the circumstances of the case has as yet been published in Europe. There seems to be no likelihood as to mistake regarding the facts. The special occurrence could probably only happen in the tropics in warm water.

H. N. MOSELEY

"In the autumn of 1878 a man committed a terrible crime in Somerset, which was for some time involved in deep mystery. His wife, a handsome and decent mulatto woman, disappeared suddenly and entirely from sight, after going home from church on Sunday, October 20. Suspicion immediately fell upon the husband, a clever young fellow of about thirty, but no trace of the missing woman was left behind, and there seemed a strong probability that the crime would remain undetected. On Sunday, however, October 27, a week after the woman had disappeared, some Somerville boatmen looking out towards the sea, as is their custom, were struck by observing in the Long Bay Channel, the surface of which was ruffled by a slight breeze, a long streak of calm such as, to use their own illustration, a cask of oil usually diffuses around it when in the water. The feverish anxiety about the missing woman suggested some strange connection between this singular calm and the mode of her disappearance. Two or three days after—why not sooner I cannot tell you—her brother and three other men went out to the spot where it was observed, and from which it had not disappeared since Sunday, and with a series of fish-hooks ranged along a long line dragged the bottom of the channel, but at first without success. Shifting the position of the boat, they dragged a little further to windward, and presently the line was caught. With water glasses the men discovered that it had caught in a skeleton which was held down by some heavy weight. They pulled on the line; something suddenly gave way, and up came the skeleton of the trunk, pelvis, and legs of a human body, from which almost every vestige of flesh had disappeared, but which, from the

minute fragments remaining, and the terrible stench, had evidently not lain long in the water. The husband was a fisherman, and Long Bay Channel was a favourite fishing-ground, and he calculated, truly enough, that the fish would very soon destroy all means of identification; but it never entered into his head that as they did so their ravages, combined with the process of decomposition, would set free the matter which was to write the traces of his crime on the surface of the water. The case seems to be an exceedingly interesting one; the calm is not mentioned in any book on medical jurisprudence that I have, and the doctors seem not to have had experience of such an occurrence. A diver went down and found a stone with a rope attached, by which the body had been held down, and also portions of the scalp and of the skin of the sole of the foot, and of clothing, by means of which the body was identified. The husband was found guilty and executed."

On the Simplest Continuous Manifolds of Two Dimensions and of Finite Extent

THERE appeared in your pages some three years ago (vol. xv. p. 515) an article of mine "On the Simplest Continuous Manifolds of Two Dimensions and of Finite Extent." In a succeeding number a correspondent (Mr. Monro, of Barnet) propounded a query which may be shortly stated as follows:—"How does it happen that the perpendicular on a geodesic from a point moving along another geodesic changes sign without passing through either the value zero (0) or the value infinity (∞)?" The problem here suggested is a peculiarly knotty one. In the case of the Euclidian plane the perpendicular of course changes sign by passing through the value ∞ , while in the case of a spherical surface it is equally obvious that the perpendicular passes through zero, since the two geodesics intersect twice. But what are we to say of the strange hybrid surface which formed the subject-matter of my paper? Your correspondent appeared to insinuate that the problem was insoluble, and that the definition of the surface must therefore involve a logical contradiction. For a while I was greatly puzzled by this unforeseen difficulty, but after a little thought came to the conclusion that the perpendicular changes sign by passing through the value $\frac{l}{2} \sqrt{-1}$, where l is positive and represents the absolute length of a complete geodesic. In other words, I conceived that the sign of the perpendicular changed from + to - by a continuous variation of the real numbers a and b in the complex number $a + b\sqrt{-1}$. I conceived a to diminish continuously till, passing through 0, it became $-a$, while b at the same time increased with simple harmonic motion from 0 to a maximum, and then decreased from a maximum to 0.

I was, however, not sufficiently clear on the matter to feel justified in addressing you until I received, the other day, a copy of a paper by Prof. Simon Newcomb, of the United States Observatory, entitled "Elementary Theorems relating to the Geometry of a Space of Three Dimensions and of Uniform Positive Curvature in the Fourth Dimension."¹ The subject-matter of this masterly paper is in reality the simplest continuous manifolds of three dimensions and of finite extent. It therefore naturally includes all that had been worked out in my own paper and a little more besides. In particular it throws strong light on the difficulty raised by your correspondent. For an exactly parallel anomaly presents itself in the theory of Prof. Newcomb's solid space, and is stated in his 13th Proposition as follows:—"The two sides of a complete plane² are not distinct, as in a Euclidian surface." If a being were to travel along a complete plane in a geodesic line, he would, on his return, find himself on the opposite side of the plane to that on which he started, and would have to repeat his journey in order to regain his original poise. "In this property," Prof. Newcomb says, "we find a certain amount of reason for considering the complete plane as a double surface." The corresponding anomaly in space of two dimensions—i.e., the specific feature noticed as an anomaly by your correspondent—is then explained as Proposition XIV.: "The following proposition is intimately connected with the preceding one. If, moving along a right line, we erect an indefinite series of perpendiculars, each in the same Euclidian plane with the one which precedes it, then, on completing the

¹ Abdruck aus dem *Journal für die reine und angewandte Mathematik*, Bd. 83. Druck von G. Reimer in Berlin.

² A "complete plane" is a geodesic surface of Prof. Newcomb's space. It is in all respects identical with the surface treated of in my paper.

line and returning to our starting-point, the perpendiculars will be found pointing in a direction the opposite of that with which we started." Here then is the solution of the difficulty. As we move over our surface along a geodesic, the instantaneous Euclidian plane containing the beginnings of successive perpendiculars (for *small initial* portions of two successive perpendiculars to a geodesic will lie in a Euclidian plane) rotates about the instantaneous tangent to the geodesic, and it does not complete a rotation until we have travelled *twice* the complete length of the geodesic. The perpendicular is a vector quantity, and changes sign by passing through $\frac{1}{2} \sqrt{-1}$. Also, a geodesic does

not divide the surface into two completely separate regions, as a great circle does a sphere or a straight line a plane. The two regions are continuous with one another, and it is possible to get from the one to the other along a finite path without crossing the geodesic.

F. W. FRANKLAND

Registrar-General's Office, Wellington,
New Zealand, April 14

Ascent of Etna

IT was a bright sunny sky on the last day of April when we started, with Giuseppe Sedici as guide, from the Grand Hotel at Catania in a carriage and pair bound for Nicoloni, *en route* to the summit of Etna. A dusty drive of two and a half hours, and we were at the door of the inn in the centre of the village. Its appearance was somewhat forlorn, and its fare rather meagre, but the civility of mine host compensated for all other defects. Here we engaged two mules, a porter, and a driver, an operation which took more than two hours, and then set off again for the Casa del Bosco, which we reached in the middle of the afternoon after a ride of two and a quarter hours. A climb up a neighbouring hillock to see the sunset, dinner, and a few hours' rest filled up the time till 11 p.m., when we started off again and rode for about half an hour, till the appearance of snow made it necessary to dismount and continue the remainder of the journey on foot. Our guide was very slow, and on any attempt to force the pace stood still and ejaculated: "Fermo, Signore! Piano, Piano!" so that we did not arrive at the Casa Inglese till 5 a.m., and were obliged to content ourselves with seeing the sun rise from here instead of from the top, as we had intended. It did not much matter, as it was a cloudy morning, and the view was very poor, but still it was a disappointment. The Casa Inglese was covered with snow to the eaves of the roof, the observatory buried altogether, the Val del Booe a sea of white. After a short rest we trudged on again; so far it had been good walking up an easy ascent of crisp snow, but now it became a work of difficulty to pick one's way through deep drifts and treacherous-looking holes, which seemed to explain the guide's reluctance to undertake this part of the route by moonlight. Arrived however at the foot of the cone, the snow ceased, and a heavy climb up the frozen side under a biting wind began. Half way up matters were not improved by a severe attack of sickness; but at length the top was reached at 6.20 a.m. There was no distant view; within the crater the steam and smoke kept being blown hither and thither, and cleared off at times sufficiently to show parts of what looked like a bottomless pit. It was a curious and weird sight altogether, and well repaid the fatigues of the journey. During the descent the notes of the cuckoo and some very sweet violets found by chance under the snow reminded us that, notwithstanding the mountain's wintry mantle of white, it was really spring time, and that the morning sun had ushered in the merry month of May, a fact which we had well nigh forgotten but a few hours before, when our fingers were numb with cold and our ears threatened to become a thing of the past.

G.

Colour Combinations

THE production of white by red and green solutions is well seen on mixing cobalt and nickel solutions together in proper proportions. Another interesting example is that of electrically deposited copper immersed in a solution of copper sulphate. The first notice of this, so far as I know, occurs in Shaw's "Manual of Electro-Metallurgy" (1842), p. 33, in the following terms:—

"This phenomenon may be observed in great perfection by the electrolyte; the solution of sulphate of copper is of an intense and pure blue; and the newly precipitated ductile copper is of

an equally pure orange; let the reader take a vessel containing the cupreous solution and place it in the sun, in order to have an abundance of light, and immerse in it, in a horizontal position, a piece of new electrotype copper; immediately the metal sinks beneath the surface of the blue solution the orange tint fades, and by placing it at a proper depth altogether vanishes, and the metallic plate appears intensely white; when nicely adjusted the plate so much resembles plaster-of-paris that a person unacquainted with the nature of the experiment would with difficulty be persuaded that it was not made of that substance."

Birmingham and Midland Institute, C. J. WOODWARD
June 14

P.S.—In mixing red and green solutions is it correct to speak of them as *producing* white? I take it that the mixture absorbs more light than the two solutions would do if separate, *i.e.*, the solution of nickel transmits a greenish white, the cobalt solution a reddish white, but together the red and green destroy each other, the excess of white light passing through. This is shown forcibly by using strong solutions, when the deep red and green produce, not white, but black.—C. J. W.

Wild Swans—Notes of Birds

THERE are at present eight wild swans in a lake not far from here. I believe them to be part of a flock of sixty which were there all through the winter. Wild swans in summer were never, so far as I know, heard of in this part of the world before. I have always carefully preserved the wild fowl on this lake, and I pay increased attention to the swans, which I hope will be safe from poachers. They swim in pairs, but show no signs of nesting.

The major cuckoo noticed in my letter (NATURE, vol. xxii. p. 76) is still here without any other major that I could find in this place or in the neighbourhood. Referring to your polite correspondent A. N., in p. 97, I must remark, for the fair fame of the cuckoos, that his theory relating to sex seems quite unsustainable. Certainly if all the minor cuckoos about here were males and the single major a female it would show an instance of polyandry (if the term can be applied to birds) such as could scarcely be matched in the whole range of natural history. I quite agree with Mr. Newton (p. 122) that the female cuckoo does not sing; and it might perhaps be unamiably suggested that the comparative silence of the females among the lower animals seems among the most marked distinctions between them and the human race.

Regarding Mr. Allen's letter (same page) I can only say that, while his experiences are so different from mine, there must be an imperfection of ear in either of us, and, without any notion of insisting on the correctness of my own, I should like, at least, to hear the testimony of other parties in the matter. Of course I referred to cuckoos in full voice in the height of the season. When their voice begins to decline, their notes vary, and, as a friend of mine expresses it, they "sing *anyhow*."

Millbrook, Tuam, June 18 J. BIRMINGHAM

Anchor-Ice

ALLOW me to say in reply to Mr. Rae's kindly criticism (NATURE, vol. xxii. p. 54) that I did not assert that the original ice-crystals are "at least as heavy as water," but that they "seem" to be so (vol. xxii. p. 81).

I have seen them collect upon stones at the bottom of waterways two or three feet in depth—where the stream though swift was smooth and unbroken,—and I have thought that this might be the result of their having a greater specific gravity than ordinary ice.

In my desire to be concise I had the misfortune to use a phrase that gave Mr. Rae the impression that I was asserting as a fact that which at best I have only regarded as possible.

Boston, June 7 C. F. C.

SCIENTIFIC RESULTS OF THE HOWGATE POLAR EXPEDITION, 1877-78

THE fifteenth *Bulletin* of the United States National Museum (Washington, 1879) consists of contributions to the Natural History of Arctic America, made in connection with the Howgate expedition in 1877-78, by Ludwig Kumlien, naturalist to the expedition, who gives